PRODUCT/PROCESS CHANGE NOTIFICATION

PCN MPA-PMT/06/1947
Notification Date 07/27/2006

New Subcontractor location (PSI-Philippines) for TO-247

PMT - POWER MOSFET

Table 1. Change Identification

Product Identification (Product Family/Commercial Product)	Power MOSFET assembled in TO-247
Type of change	Package assembly location change
Reason for change	to extend capacity for TO-247 package
Description of the change	Power MOSFET Division has been decided to set up a new location for TO-247 package.New Assembly plant will be added to the current one. New location will be in PSI-Philippines. No change in process, except mechanical data comparison, reported in attached file.
Product Line(s) and/or Part Number(s)	See attached
Description of the Qualification Plan	See attached
Change Product Identification	See "7P" on Traceability code
Manufacturing Location(s)	

Table 2. Change Implementation Schedule

Forecasted implementation date for change	18-Oct-2006
Forecasted availabillity date of samples for customer	18-Jul-2006
Forecasted date for **STMicroelectronics** change Qualification Plan results availability	18-Jul-2006
Estimated date of changed product first shipment	18-Oct-2006

Table 3. Change Responsibility

	Name	Signature	Date
Division Product Manager	Ian Wilson		Jul.18 ,06
Division Q.A. Manager	Giuseppe Falcone		Jul.18 ,06
Division Marketing Manager	Maurizio Giudice		Jul.18 ,06

Table 4. List of Attachments

Customer Part numbers list	
Qualification Plan results	

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Customer Acknowledgement of Receipt **PCN MPA-PMT/06/1947**

Please sign and return to STMicroelectronics Sales Office **Notification Date 07/27/2006**

☐ Qualification Plan Denied	Name:
☐ Qualification Plan Approved	Title:
	Company:
☐ Change Denied	Date:
☐ Change Approved	Signature:

Remark

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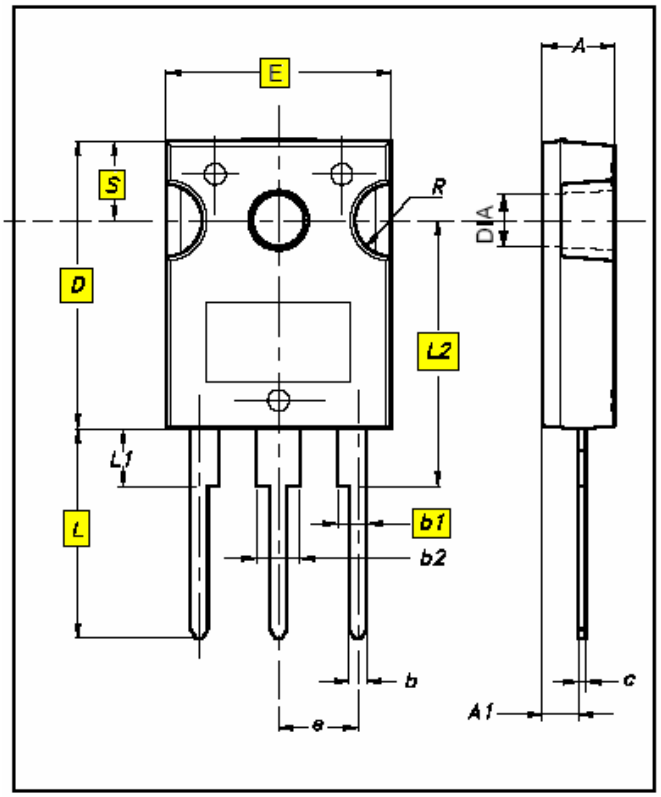
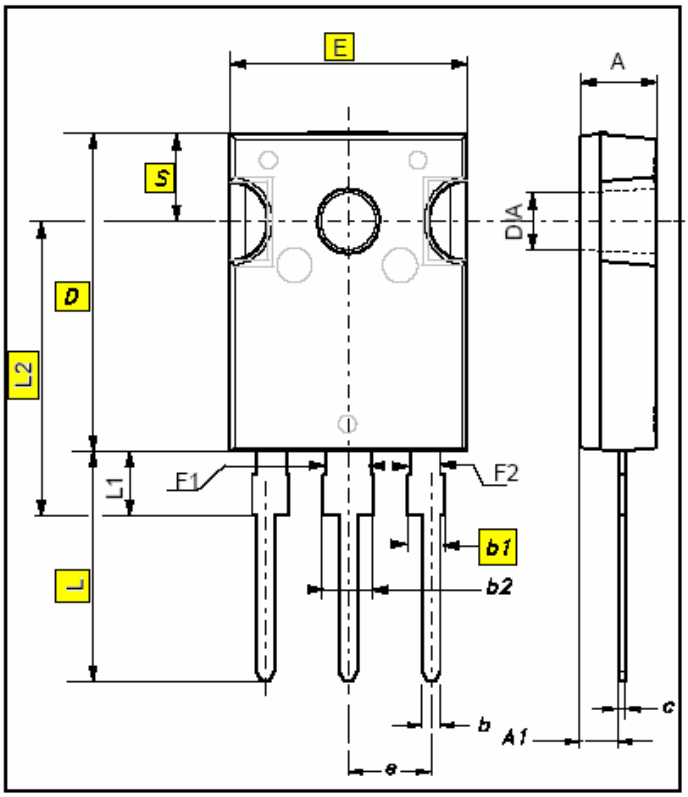
TO247 by ST



TO247 by PSI



REF.	DATASHEET TO247 by ST (mm)			DRAWING TO247 by PSI (mm)		
	TYP	MIN	MAX	TYP	MIN	MAX
A		4.85	5.15		4.90	5.16
A1		2.20	2.60		2.35	2.45
b		1.0	1.40		1.20	1.33
b1		2.0	2.40		1.90	2.13
b2		3.0	3.40		3.04	3.20
F1				3		
F2				2		
c		0.40	0.80		0.6	0.76
D		19.85	20.15		20.83	21.09
E		15.45	15.75		15.77	16.03
e	5.45			5.45		
L		14.20	14.80		20.04	20.31
L1		3.70	4.30		3.93	4.45
L2	18.50				18.72	19.18
DIA		3.55	3.65		3.56	3.66
S	5.50				6.04	6.30
R		4.50	5.50			

RELIABILITY EVALUATION

ON

TO-247 ASSEMBLED IN PSI SUBCONTRACTOR

Table of Contents

1. Introduction pg. 3

2. Test vehicles pg. 4

3. Failure Criteria pg. 5

4. Evaluation plan and results pg. 6

5. Appendixes

- Technological Characteristics pg. 9
- Reliability Test Description pg. 12

Introduction

This report aims at the internal qualification of the package TO-247 assembled in subcontractor PSI

The Qualification Reliability test trials have been performed in ST Catania Site.

The evaluation results meet ST products qualification targets, therefore the TO-247 package is qualified in PSI.

Test Vehicles:

Product Lines	Main Sales Types
EZ57	STW14NK50Z
EZ98	STW12NK90Z
EZ9K	STW9NK90Z

Failure Criteria :

A failed component is a device which becomes inoperative during the test or it fails on meeting the end limits foreseen in the device specification, for one or more than the parameters here below reported

Parameter Power MOSFET

Drain Leakage Current (Idss)
Gate Leakage Current (Igss)
Threshold Voltage (Vgs(th)
Forward On Voltage (Vsd)
Drain Source On Voltage (Vds(on))
Drain Source Breakdown Voltage (Bvdss)

Reliability Evaluation Plan and results

D.U.T. : STW14NK50Z LINE: EZ57 PACKAGE: TO-247

Test	Conditions	S.S.	Requirement	Results
H.T.S.	TA=150℃	77 x 1 Lot	Parameter deviation within spec. limits at 1000 hours.	*No parameter deviation out of spec. limits at 1000 hours.*
T.H.B.	TA=85℃ - RH=85% Vbias= 100V	77 x 1 Lot	Parameter deviation within spec. limits at 1000 hours.	*No parameter deviation out of spec. limits at 1000 hours.*
H.T.R.B.	T.A.=150℃; Vces=400V	77 x 1 Lot	Parameter deviation within spec. limits at 1000 hours.	*No parameter deviation out of spec. limits at 1000 hours.*
H.T.F.B.	TA = 150℃ ; Vgss= 30V	77 x 1 Lot	Parameter deviation within spec. limits at 1000 hours.	*No parameter deviation out of spec. limits at 1000 hours.*
PRESSURE POT	TA=121℃ - PA=2Atm	77 x 1 Lot	Parameter deviation within spec. limits at 96 hours.	*No parameter deviation out of spec. limits at 96 hours.*
THERMAL CYCLES AIR TO AIR	TA=-55℃ TO 150℃ 1 HOUR / CYCLE	77 x 1 Lot	Parameter deviation within spec. limits at 500 cycles.	*No parameter deviation out of spec. limits at 500 cy*
THERMAL SHOCKS LIQUID TO LIQUID	TA=-55℃ TO 150℃ 10 MIN / SHOCK	77 x 1 Lot	Parameter deviation within spec. limits at 500 shocks.	*No parameter deviation out of spec. limits at 500 sh.*
THERMAL FATIGUE	TC=70℃ - Pd=24W	77 x 1 Lot	Parameter deviation within spec. limits at 10k cycles.	*No parameter deviation out of spec. limits at 10Kcy.*
ENVIRONMENTAL SEQUENCE	100 THERMAL CYCLES + 96H PP	50 x 1 Lot	Parameter deviation within spec. limits at end of test.	*No parameter deviation out of spec. limits at end of test.*

Reliability Evaluation Plan and results

D.U.T. : STW12NK90Z LINE: EZ98 PACKAGE: TO-247

Test	Conditions	S.S.	Requirement	Results
H.T.S.	TA=150℃	77 x 1 Lot	Parameter deviation within spec. limits at 1000 hours.	*No parameter deviation out of spec. limits at 1000 hours.*
T.H.B.	TA=85℃ - RH=85% Vbias= 100V	77 x 1 Lot	Parameter deviation within spec. limits at 1000 hours.	*No parameter deviation out of spec. limits at 1000 hours.*
H.T.R.B.	T.A.=150℃; Vces=720V	77 x 1 Lot	Parameter deviation within spec. limits at 1000 hours.	*No parameter deviation out of spec. limits at 1000 hours.*
H.T.F.B.	TA = 150℃ ; Vgss= 30V	77 x 1 Lot	Parameter deviation within spec. limits at 1000 hours.	*No parameter deviation out of spec. limits at 1000 hours.*
PRESSURE POT	TA=121℃ - PA=2Atm	77 x 1 Lot	Parameter deviation within spec. limits at 96 hours.	*No parameter deviation out of spec. limits at 96 hours.*
THERMAL CYCLES AIR TO AIR	TA=-55℃ TO 150℃ 1 HOUR / CYCLE	77 x 1 Lot	Parameter deviation within spec. limits at 500 cycles.	*No parameter deviation out of spec. limits at 500 cy*
THERMAL SHOCKS LIQUID TO LIQUID	TA=-55℃ TO 150℃ 10 MIN / SHOCK	77 x 1 Lot	Parameter deviation within spec. limits at 500 shocks.	*No parameter deviation out of spec. limits at 500 sh.*
THERMAL FATIGUE	TC=70℃ - Pd=24W	77 x 1 Lot	Parameter deviation within spec. limits at 10k cycles.	*No parameter deviation out of spec. limits at 10Kcy.*
ENVIRONMENTAL SEQUENCE	100 THERMAL CYCLES + 96H PP	50 x 1 Lot	Parameter deviation within spec. limits at end of test.	*No parameter deviation out of spec. limits at end of test.*

Reliability Evaluation Plan and results

D.U.T. : STW9NK90Z LINE: EZ9K PACKAGE: TO-247

Test	Conditions	S.S.	Requirement	Results
H.T.S.	TA=150℃	77 x 1 Lot	Parameter deviation within spec. limits at 1000 hours.	*No parameter deviation out of spec. limits at 1000 hours.*
T.H.B.	TA=85℃ - RH=85% Vbias= 100V	77 x 1 Lot	Parameter deviation within spec. limits at 1000 hours.	*No parameter deviation out of spec. limits at 1000 hours.*
H.T.R.B.	T.A.=150℃; Vces=720V	77 x 1 Lot	Parameter deviation within spec. limits at 1000 hours.	*No parameter deviation out of spec. limits at 1000 hours.*
H.T.F.B.	TA = 150℃ ; Vgss= 30V	77 x 1 Lot	Parameter deviation within spec. limits at 1000 hours.	*No parameter deviation out of spec. limits at 1000 hours.*
PRESSURE POT	TA=121℃ - PA=2Atm	77 x 1 Lot	Parameter deviation within spec. limits at 96 hours.	*No parameter deviation out of spec. limits at 96 hours.*
THERMAL CYCLES AIR TO AIR	TA=-55℃ TO 150℃ 1 HOUR / CYCLE	77 x 1 Lot	Parameter deviation within spec. limits at 500 cycles.	*No parameter deviation out of spec. limits at 500 cy*
THERMAL SHOCKS LIQUID TO LIQUID	TA=-55℃ TO 150℃ 10 MIN / SHOCK	77 x 1 Lot	Parameter deviation within spec. limits at 500 shocks.	*No parameter deviation out of spec. limits at 500 sh.*
THERMAL FATIGUE	TC=70℃ - Pd=24W	77 x 1 Lot	Parameter deviation within spec. limits at 10k cycles.	*No parameter deviation out of spec. limits at 10Kcy.*
ENVIRONMENTAL SEQUENCE	100 THERMAL CYCLES + 96H PP	50 x 1 Lot	Parameter deviation within spec. limits at end of test.	*No parameter deviation out of spec. limits at end of test.*

Technological Characteristics

D.U.T. : STW14NK50Z LINE: EZ57 PACKAGE: TO-247

DIE	*Technology:* SuperMESH™ MOSFET *Material:* Silicon		*Passivation :*	None
	Metallization – Front : Al/Si *- Back :* Ti-Ni-Au		*Dimensions :*	5720 x 4580 µm
DIE ATTACH	Soft Solder	**FRAME**	*Frame and lead material:* *Lead coating :*	Full Ni Sn 100%
WIRE BOND	Ultrasonic	**WIRE**	*Material :* *Diameter :*	Al Gate Al Source 5 mils Gate 10 mils Source
SEALING	Molding	**PACKAGING**	*Material :*	Epoxy Resin

PRODUCTION PLACES : WAFER PROCESSING : SINGAPORE
ASSEMBLY LOCATION : PSI
Q.A. LOCATION : PSI

Technological Characteristics

D.U.T. : STW12NK90Z LINE: EZ98 PACKAGE: TO-247

DIE	*Technology:* SuperMESH™ MOSFET *Material:* Silicon *Passivation :* None *Metallization – Front :* Al/Si *Dimensions :* 7830 x 5670 µm *- Back :* Ti-Ni-Au			
DIE ATTACH	Soft Solder	**FRAME**	*Frame and lead material:* *Lead coating :*	Full Ni Sn 100%
WIRE BOND	Ultrasonic	**WIRE**	*Material :* *Diameter :*	Al Gate Al Source 5 mils Gate 10 mils Source
SEALING	Molding	**PACKAGING**	*Material :*	Epoxy Resin

PRODUCTION PLACES : WAFER PROCESSING : SINGAPORE
ASSEMBLY LOCATION : PSI
Q.A. LOCATION : PSI

Technological Characteristics

D.U.T. : STW9NK90Z LINE: EZ9K PACKAGE: TO-247

DIE	*Technology:* SuperMESH™ MOSFET *Material:* Silicon *Metallization – Front :* Al/Si *- Back :* Ti-Ni-Au		*Passivation :* *Dimensions :*	None 6320 x 4620 µm
DIE ATTACH	Soft Solder	**FRAME**	*Frame and lead material:* *Lead coating :*	Full Ni Sn 100%
WIRE BOND	Ultrasonic	**WIRE**	*Material :* *Diameter :*	Al Gate Al Source 5 mils Gate 10 mils Source
SEALING	Molding	**PACKAGING**	*Material :*	Epoxy Resin

PRODUCTION PLACES : WAFER PROCESSING : CATANIA
ASSEMBLY LOCATION : PSI
Q.A. LOCATION : PSI

Reliability Test Description

High Temperature Reverse Bias (HTRB)

This test is performed in order to demonstrate the quality and reliability of devices subjected to an elevated temperature and simultaneously reverse biased. The purpose of this test is to detect surface defects such as poor passivation, presence of contaminants, etc...

High Temperature Forward Bias (HTFB)

This test is performed in order to demonstrate the quality and reliability of devices subjected to an elevated temperature and simultaneously forward gate biased. The purpose of this test is to detect surface and gate oxide defects.

High Temperature Storage (HTS)

This stress test is performed to check the device life in a high temperature ambient. Specimens are put for a period of time inside a stove in free air. Detectable failure mechanisms are presence of contaminants and metal corrosion.

Thermal Cycles/Shocks

The purpose of this test is to determine the resistance of devices to exposure to extreme changes in temperature. Specimens are first placed in a suitable environment at a low temperature and then transferred to one at high temperature. Effects of thermal cycles/shocks include cracking of die, breaking of wire bonding, mechanical damage to the device case.

Reliability Test Description (continued)

Temperature Humidity Bias (THB)

This test is performed to check the device life in a high humidity ambient. Specimens are subjected to a permanent bias in a climatic chamber in the presence of steam. Detectable failure mechanisms are metal corrosion and moulding defects.

Pressure Pot

This test is performed in order to check device life in a high humidity ambient in an accelerated way. Specimens are subjected for a period of time inside an autoclave in the presence of steam and pressure. Detectable failure mechanism is metal corrosion.

Thermal Fatigue

This test is performed to demonstrate the quality and reliability of devices exposed to cyclic variation in electrical stress between "on" and "off" conditions and resultant cyclic variation in device and case temperatures (thermo-mechanical stress). The purpose of this test is to detect assembly defects : improper die-attach, bonding weakness and thermal mismatch among various components of the package.

Environmental Sequence

The purpose of this test is to study the influence of corrosion mechanism when the die/package system has already been stressed by temperature cycling.